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## **Ablation of atrial fibrillation after the retirement age: considerations on safety and outcome**

Haegeli, L M ; Duru, F ; Lockwood, E E ; Lüscher, T F ; Sterns, L D ; Novak, P G ; Leather, R A

**Abstract:** **BACKGROUND:** Although the incidence of atrial fibrillation (AF) progressively increases with age, the vast majority of AF ablation is done in middle-aged patients. We evaluated the feasibility and safety of catheter ablation in patients older than 65 years of age with paroxysmal and persistent AF. **METHODS:** Out of a total of 230 consecutive AF ablation procedures, 45 patients were older than 65 years of age and underwent 53 procedures. The ablation strategy consisted of wide-area circumferential lines around both ipsilateral pulmonary veins using a three-dimensional mapping system. **RESULTS:** The mean age was  $69 \pm 3.5$  years (35 males). The mean duration for AF was  $8.7 \pm 6.5$  years. Thirty-nine had paroxysmal and six persistent AF despite use of  $1.38 \pm 0.77$  antiarrhythmic drugs. All patients had a structurally normal heart. Eleven had systemic hypertension. Mean procedure time was  $187 \pm 33$  min. Acute procedural success rate with abolition of all pulmonary vein potentials was achieved in all patients. Pericardial tamponade requiring percutaneous drainage occurred in one (1.9%) patient. There were no cardioembolic events. Among the 43 patients whose clinical outcome was assessed at 6 months, 34 (79%) had a significant reduction ( $>90\%$ ) of the total symptomatic AF burden, compared to pre-ablation, with a complete lack of symptomatic AF in 32 (74%) patients. The success rate was higher for patients with paroxysmal versus persistent AF (81 vs. 67%). Six patients (11%) underwent repeat procedures. **CONCLUSIONS:** Catheter ablation is a safe and effective treatment for patients over the age of 65 years with symptomatic, drug-refractory AF. Therefore, patients should not be excluded from undergoing AF catheter ablation on the basis of age alone.

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# Ablation of atrial fibrillation after the retirement age: considerations on safety and outcome

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## Abstract

**Background** Although the incidence of atrial fibrillation (AF) progressively increases with age, the vast majority of AF ablation is done in middle-aged patients. We evaluated the feasibility and safety of catheter ablation in patients older than 65 years of age with paroxysmal and persistent AF.

**Methods** Out of a total of 230 consecutive AF ablation procedures, 45 patients were older than 65 years of age and underwent 53 procedures. The ablation strategy consisted of wide-area circumferential lines around both ipsilateral pulmonary veins using a three-dimensional mapping system.

**Results** The mean age was  $69 \pm 3.5$  years (35 males). The mean duration for AF was  $8.7 \pm 6.5$  years. Thirty-nine had paroxysmal and six persistent AF despite use of  $1.38 \pm 0.77$  antiarrhythmic drugs. All patients had a structurally normal heart. Eleven had systemic hypertension. Mean procedure time was  $187 \pm 33$  min. Acute procedural success rate with abolition of all pulmonary vein potentials was achieved in all patients. Pericardial tamponade requiring percutaneous drainage occurred in one (1.9%) patient. There were no cardioembolic events. Among the 43 patients whose clinical outcome was assessed at 6 months, 34 (79%) had a significant reduction ( $>90\%$ ) of the total symptomatic AF

burden, compared to pre-ablation, with a complete lack of symptomatic AF in 32 (74%) patients. The success rate was higher for patients with paroxysmal versus persistent AF (81 vs. 67%). Six patients (11%) underwent repeat procedures.

**Conclusions** Catheter ablation is a safe and effective treatment for patients over the age of 65 years with symptomatic, drug-refractory AF. Therefore, patients should not be excluded from undergoing AF catheter ablation on the basis of age alone.

**Keywords** Atrial fibrillation · Catheter ablation · Elderly · Safety · Outcome

## 1 Background

Atrial fibrillation (AF) is the most common of all cardiac arrhythmias with an incidence and prevalence to be on the rise. AF is a disease of the elderly with a prevalence increasing with age. Up to 5% of the population over the age of 65 years are suffering from AF [1]. The median age of a patient with AF is 75 years and 70% of the AF patients are aged 65 to 85 years of age [2, 3]. Disease management is challenged in elderly AF patients by frequent comorbidities including hypertension, congestive heart failure, left ventricular hypertrophy, coronary artery disease, and diabetes mellitus placing them at increased risk for thromboembolic complications with AF [4], side effects, and pro-arrhythmias.

Radiofrequency catheter ablation is widely performed as an effective treatment for recurrent, drug-resistant AF [5–8]. Ablation techniques have improved and the complication rate has decreased [9–12]. As a result, referrals of elderly patients for catheter ablation of AF are on the

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Drs. Haegeli and Duru contributed equally to this article and are shared first authors.

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**Table 1** Patient assessment form

1. Have you had any of the following symptoms?

- Occasional skips and jumps in the heart? Y / N (please circle)
- Regular racing heart beat? Y / N (please circle)
- Irregular racing heart beat? Y / N (please circle)

2. Please chart the amount of racing you have had below (months after ablation):

	4 <sup>th</sup> month	5 <sup>th</sup> month	6 <sup>th</sup> month
Number of episodes?			
How long do they last?			

3. Did you require treatment in hospital? medication only electrical cardioversion

4. Do they feel the same as before the procedure? Y / N (please circle)

If not, why?

Not as fast

Symptoms not as bad

Regular (was irregular before)

Shorter duration

Other.....

5. Overall, how do you feel compared to before the procedure? (place a mark on the line)

Worse

Same

Improved by:

50%

75%

90%

100%



6. Are you or your doctor considering a repeat ablation procedure? Y / N

7. Are you taking fewer medications for AF than before the procedure? Y / N

8. Are you still taking warfarin (also called coumadin)? Y / N

9. Have you had a pacemaker implanted since your ablation? Y / N

rise. However, few elderly patients were included in prior AF catheter ablation studies. With increasing life expectancy, the elderly are the most rapidly expanding portion of our population making AF an even more important public health concern. Catheter ablation for the elderly could be an important treatment strategy after failed antiarrhythmic drug therapy. We aimed to assess feasibility, safety, and outcome of AF catheter ablation procedure in an elderly patient population.

## 2 Methods

**Study patients** Consecutive patients over the age of 65 years with symptomatic paroxysmal and persistent AF undergoing a percutaneous catheter ablation procedure at the Royal Jubilee Hospital in Victoria B.C. (Canada) were included in this study. None of the patients had a significant structural heart disease. Demographic and clinical data were collected prior to the procedure. All patients gave informed consent prior to the procedure.

**Ablation procedure** All patients underwent a wide-area circumferential pulmonary vein isolation for paroxysmal AF and additional linear lesions for persistent AF. For that purpose, three femoral vein sheaths were inserted under local anesthesia. A 6F steerable decapolar electrophysiology catheter Livewire™ (St. Jude Medical Inc., St. Paul, MN, USA) was placed into the coronary sinus. After double transseptal puncture performed using a BRK™ transseptal needle (St. Jude Medical Inc., St. Paul, MN, USA), a 5F circular decapolar catheter SCT™ (St. Jude Medical Inc., St. Paul, MN, USA) and a 7F non-irrigated 4-mm tip bi-directional ablation catheter RF Conductr™ MC (Medtronic Inc., Minneapolis, MN, USA) were passed transseptally through two 8F transseptal guiding introducers Swartz™ SL1™ (St. Jude Medical Inc., St. Paul, MN, USA). The catheter ablation was performed using radiofrequency energy under Ensite NavX™ mapping system (St. Jude Medical Inc., St. Paul, MN, USA) guidance.

The ablation strategy consisted of continuous wide-area circumferential lines around both ipsilateral pulmonary veins. Lesions were delivered for 30 s, at 35 W for a maximum target temperature of 58°C. For patients with persistent AF, additional linear lesions were performed: a left atrial roof line connecting both upper left and right pulmonary veins and a left atrial isthmus line between the mitral valve annulus and the left inferior pulmonary vein. The additional left atrial lines were not routinely mapped and checked for conduction block and no ablation within the coronary sinus was performed. The endpoint of the procedure in both paroxysmal and persistent AF patients was electrical isolation of all pulmonary veins, which was

**Table 2** Patient characteristics

	n=45
Age (years)	69±3.5
Sex (male)	35 (78%)
Type of AF	
Paroxysmal AF	39 (87%)
Persistent AF	6 (13%)
History of AF (years)	8.7±6.5
Number of AAD	1.38±0.77

AAD antiarrhythmic drug, LA left atrium, EF ejection fraction

assessed using the circular spiral catheter. No systematic mapping was performed in order to identify non-pulmonary vein or pulmonary vein triggers of AF. The procedure was performed under conscious sedation using midazolam and fentanyl. This ablation protocol did not differ from the ablation approach in younger AF patients treated in our institution.

**Anticoagulation strategy** Warfarin was discontinued 3 days prior to the procedure to allow INR to drop in a subtherapeutic range the day of the procedure (INR<2.0). After insertion of the transseptal catheters, therapeutic anticoagulation was initiated with a bolus of intravenous heparin (100 IU/kg bodyweight). Activated clotting time (ACT) was monitored in 30-min intervals followed by additional boluses of heparin to keep the ACT with a target of 300 s. Oral anticoagulation was resumed on the same day of the procedure for at least 3 months.

The clinical outcome after the ablation procedure was assessed using a patient assessment form at 6 months after the intervention (Table 1).

## 3 Results

Out of a total of 230 consecutive AF ablation procedures, 45 patients were older than 65 years of age and underwent

**Table 3** Procedural statistics

	n=53
Average procedure time (minutes)	187±33
Fluoroscopy time (minutes)	43±12
Major complications	
Thromboembolic event and stroke	None
Pericardial tamponade	1 (1.9%)
Vascular access complications	None

ACT activated clotting time, IU international units

53 procedures. Of the 53 ablation procedures were eight repeat procedures. The mean age of our population was  $69 \pm 3.5$  years. The patient characteristics are shown in Table 2. All had a structurally normal heart. The procedural characteristics are shown in Table 3. The mean procedure time was  $187 \pm 33$  min. Acute procedural success rate with abolition of all pulmonary vein potentials was achieved in all patients. Pericardial effusion requiring percutaneous drainage occurred in one (1.9%) patient. There were neither acute nor late peripheral or cerebral thromboembolic events observed. None of the procedures were complicated by vascular access complications requiring transfusion or surgical interventions. Among the 43 patients whose clinical outcome was assessed at 6 months, 34 (79%) had a significant reduction of the total symptomatic AF episodes, compared to pre-ablation, with a complete lack of symptomatic AF in 32 (75%) patients and partial success (defined as  $>90\%$  improvement in symptoms) in the remaining two (4%). The success rate was higher for patients with paroxysmal versus persistent AF (81% vs. 67%). Six patients (11%) underwent repeated procedures.

#### 4 Discussion

The majority of AF patients seeking medical treatment are in the elderly age group which is often complicated by comorbidities making antiarrhythmic drug treatment difficult. Because of hypertension, congestive heart failure, left ventricular hypertrophy, and coronary artery disease antiarrhythmic drug treatment often fails due to side effects, pro-arrhythmia, or poor rhythm control. Since few years now radiofrequency catheter ablation is widely performed as an effective treatment for recurrent, drug-refractory AF. However, few elderly patients were included in prior AF catheter ablation studies and the current guidelines for catheter ablation of AF recommend a conservative approach in the elderly patient population in the absence of clinical data [13].

Our study results suggest that catheter ablation of AF in patients aged 65 years or more can be performed with success rates comparable to those in younger patients without an increase in complication rate. Successful maintenance of a stable sinus rhythm could be achieved in nearly 80% of this patient population with a mean age of 69 years. The rate for major complication was low with one patient (1.9%) having an acute pericardial effusion requiring percutaneous drainage. No other major complications including death, thromboembolism, atrioesophageal fistula, or vascular access complications occurred. Zado et al. [14] found similar success and complication rates in patients' age group over 65 years. Interestingly, they were more likely to be women (up to 56% in the age group over

75 years). Patients over age 80 years in the paper of Tan et al. [15] were less likely to undergo a repeat procedure than younger patients, but again the success and complication rates were not significantly different in the age group over 80 years than in those 60–69 years (70% versus 74% for success rate). Another study by Bunch et al. [16] found also no increased risk of periprocedural complications in 35 patients aged 80 years and older.

**Limitations** This is an observational cohort study, and is not a prospective, randomized trial. In the absence of a direct randomized comparison of an invasive versus non-invasive approach in the elderly AF patients, limited conclusions regarding outcome and safety of the catheter ablation procedure in this population can be made. Furthermore, the freedom of AF was assessed based on symptoms reported by the patients only, and no clear uniform long-term rhythm monitoring was performed in all patients.

#### 5 Conclusions

Catheter ablation for AF can be performed in elderly patients group aged 65 years and more with normal hearts and predominantly paroxysmal AF, with comparable success and complication rates to those in younger patients. Therefore, ablation therapy should be considered as an appropriate therapeutic option for this patient group. Patients should not be excluded from undergoing AF catheter ablation on the basis of age alone.

**Conflicts of interest** None.

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